

CLAIMS:

What is claimed is:

1. An apparatus for reducing in size a medical device comprising:
  - at least three coupled movable blades disposed about a reference circle to
- 5 form an aperture whose size may be varied, the aperture capable of being sized to contain the medical device,
  - each blade in communication with an actuation device which is capable of moving the blade to alter the size of the aperture,
  - wherein each blade includes a single radial point which
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  - a) lies on a radial line of the reference circle prior to movement of the blade, and
  - b) may be moved only along the radial line of the reference circle on movement of the blade.
2. The apparatus of claim 1 wherein the blades are constructed and arranged to
- 15 form a shrinkable polygonal aperture.
3. The apparatus of claim 1 wherein the blades are constructed and arranged to form a substantially circular aperture.
4. The apparatus of claim 1 wherein the actuation device comprises
  - a cam, and
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  - a plurality of linear slide devices,
  - each of the linear slide devices in mechanical communication with the cam,
- and each blade is mounted to a linear slide device,
  - each linear slide device movable along an axis parallel to the radius on which the
- 25 radial point of the blade lies.
5. The apparatus of claim 1 comprising from 4 to 16 blades.
6. The apparatus of claim 5 comprising 8 blades.
7. The apparatus of claim 1 wherein the blades are disposed about a reference tube to form a tubular aperture whose size may be varied, the reference circle lying along the
- 30 reference tube,
  - each blade in communication with an actuation device which is capable of moving the blade to alter the size of the tubular aperture,
  - each blade includes a single line which

- a) lies on the circumference of the reference tube prior to movement of the blade, and
- b) may be moved only along a radial plane of the reference tube on movement of the blade.

5    8.     The apparatus of claim 7 wherein the reference tube is a cylinder.

9.     The apparatus of claim 1 in combination with a medical device which may be reduced in size, the medical device selected from the group consisting of stents, grafts stent-grafts and vena cava filters.

10    10.    The apparatus of claim 1 wherein each blade has an inner end and an outer end, the inner end being beveled to form a tip.

11.    The apparatus of claim 13 wherein the single radial point on each blade is at the tip of the blade

12.    An apparatus for applying a radial inward force to a medical device comprising:  
at least three coupled movable blades disposed about a reference circle to  
15 form an aperture whose size may be varied, the aperture capable of being sized to contain the medical device,

each blade in communication with an actuation device which is capable of moving the blade to alter the size of the aperture,

wherein each blade includes a single radial point which

20            a) lies on the circumference of the reference circle prior to movement of the blade, and  
              b) may be moved only along a radius of the reference circle on movement of the blade.

13.    The apparatus of claim 12 with a medical device selected from the group  
25 consisting of stents, grafts, stent-grafts and vena cava filters disposed in the aperture.

14.    The apparatus of claim 13 wherein the medical device is disposed about a catheter.

15.    An apparatus for crimping a medical device comprising:  
at least three coupled movable blades disposed about a reference circle to  
30 form an aperture whose size may be varied, the aperture capable of being sized to contain the medical device,

each blade in communication with an actuation device which is capable of moving the blade to alter the size of the aperture,

wherein each blade includes a single radial point which

- a) lies on the circumference of the reference circle prior to movement of the blade, and
- b) may be moved only along a radius of the reference circle on movement of the blade.

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16. A method of manipulating a medical device comprising the steps of:  
providing a medical device;

providing at least three blades capable of applying a radial inward force, the  
blades disposed about a reference circle to form a shrinkable aperture;

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placing the medical device into the shrinkable aperture;  
simultaneously moving the blades inward to apply a radial inward force to the  
medical device;

wherein the blades are constructed and arranged such that each blade has a single  
point which

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- a) lies on the circumference of the reference circle prior to movement of the blade, and
- b) is moved along a radius of the reference circle on movement of the blade.

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17. The method of claim 16 wherein the medical device is selected from the group  
consisting of stents, stent-grafts, grafts and vena cava filters.

18. The method of claim 17 wherein the medical device is reduced in size.

19. The method of claim 17 wherein the medical device is characterized by a  
diameter and the diameter is reduced in size.

20. The method of claim 17 wherein the medical device is disposed about a catheter.

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21. The method of claim 17 wherein the medical device is disposed about a balloon  
which is disposed about a catheter.

22. The method of claim 20 wherein a sufficient radial inward force is applied to  
crimp the medical device to the catheter.

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23. The method of claim 21 further comprising the steps of:  
simultaneously moving the blades outward; and  
removing the medical device from the aperture.

24. A method of molding a balloon comprising the steps of:  
providing a balloon preform;

providing at least three movable blades disposed about a reference tube to form a shrinkable tubular aperture, wherein the blades are constructed and arranged such that each blade has a single line which

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- b) is moved along a radial plane of the reference tube on movement of the blade;

placing the balloon preform into the shrinkable aperture;

providing an inflation fluid; and

- 10                  inflating the balloon preform so that the preform contacts the blades.

25.     The method of claim 24 wherein the balloon is heated during the inflating step to form a balloon.

26.     The method of claim 25 wherein the inflation fluid is removed from the formed balloon and the balloon is removed from the aperture.